

# Biological resources and biodiversity

## Context

### Issues at stake

**Biodiversity and ecosystem services** are integral elements of natural capital. Biodiversity, which encompasses species, ecosystems, and genetic diversity, provides invaluable ecosystem services (including raw materials for many sectors of the economy) and plays an essential role in maintaining life-support systems and quality of life.

The **loss of biodiversity** is a key concern nationally and globally. It reduces ecosystem resilience and increases vulnerability to threats such as the negative impacts of climate change. Pressures on biodiversity can be physical (e.g. habitat alteration and fragmentation through changes in land use and sea use, and changes in land cover, over-exploitation of natural resources), chemical (toxic contamination, acidification, oil spills, other pollution from human activities) or biological (e.g. alteration of population dynamics and species structure through invasive alien species or the commercial use of wildlife resources). Other factors that play a role are changes in climate and weather conditions.

### Policy challenges

The main challenge is to ensure **effective conservation and sustainable use** of biodiversity. This implies strengthening the degree of protection of species, habitats and terrestrial, marine and other aquatic ecosystems, including oceans. Strategies include eliminating illegal exploitation and trade of endangered species, eliminating illegal, unreported and unregulated fishing, putting in place ambitious policy mixes (regulatory approaches, economic instruments, and other information and voluntary approaches); and integrating biodiversity concerns into economic and sectoral policies. Biodiversity preservation and restoration also requires reforming and removing environmentally harmful subsidies and strengthening the role of biodiversity-relevant taxes, fees and charges, as well as other economic instruments such as payments for ecosystem services, biodiversity offsets and tradable permits (such as transferable quotas for fisheries).

## Land cover change Vegetation loss since 1992, Percentage, 2019 or latest available



Source: OECD, "Land resources: Land cover change in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/3bce4397-en>.

### Measuring progress and performance

Environmental performance can be assessed against domestic objectives and international goals and commitments. **Biodiversity** is also an integral part of the 2030 Agenda for Sustainable Development (New York, September 2015) under [Goal 15](#) "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" and [Goal 14](#) "Conserve and sustainably use the oceans, seas and marine resources for sustainable development".

The main international agreement on biodiversity is the 1992 Convention on Biological Diversity. Other relevant international agreements are: the 1979 Convention on the Conservation of Migratory Species of Wild Animals, the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora, the 1971 Convention on Wetlands of International Importance, the 1979 Convention on the Conservation of European Wildlife and Natural Habitats and the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing that entered into force in June 2016.

### Indicator groups

- Land cover: land cover by type, built-up areas, loss and gain of natural and semi-natural vegetated land.
- Forest resources: forest area and intensity of use of forest resources.
- Threatened species and protected areas: percentage of threatened mammals, vascular plants, freshwater fish, birds and amphibians, and protected areas by management categories.
- Taxes relevant for biodiversity: revenue raised and tax base structure.

## Land cover

### Key messages

- **Built-up areas** have increased by 16% in the OECD area since 2000 now making up 1.1% of total area. OECD Europe, is the region which has the highest built-up rate (2.6% of total area). There is around 284 m<sup>2</sup> of built-up area per inhabitant in OECD countries, almost 3 times the world average.
- **Tree cover** makes up about one third of OECD area, the largest share.
- Within the OECD, while the total area of **natural and semi-natural areas** had decreased by around 0.5% since 1992, they have remained at a constant level since 2004. Most natural and semi-natural land is converted to cropland. Gains of (semi-)natural land are unlikely to compensate for losses.

### Main trends and recent developments

**Built-up areas** increased by 16% in the OECD area from 2000 to 2014, now making up 1.1% of all area. This is equivalent to around 284 m<sup>2</sup> per inhabitant in OECD countries, almost 3 times the world average. OECD Europe has the highest share of land built-up (2.6%) whereas OECD America and OECD Asia-Oceania have rates below 1% (mainly because of low intensities in Canada and Australia). Worldwide, built-up areas expanded by 20% from 2000 to 2014, mostly driven by developing countries in Africa and South East Asia.

**Tree cover** makes up about one-third of the OECD area as a whole. However, the distribution is heterogeneous across countries. For instance, cropland makes up the majority of many countries' territory (Hungary, Denmark, Belgium, Turkey, Italy and France) whereas it represents less than 6% of Iceland, Norway, New Zealand and Canada territories.

The **natural and semi-natural area** in OECD member countries has remained broadly stable in recent decades. This is in contrast with some other regions of the world where natural and semi-natural areas have come under intense pressure from agriculture, urbanisation, resource extraction and infrastructure. Among OECD countries, from 1992 to 2019, the most intense losses of (semi-)natural land have occurred in Korea and Israel. Most natural and semi-natural land is converted to cropland. In most countries, new cropland is converted primarily from tree-covered areas but conversions from grassland and shrubland are important in some countries. In some cases the change may be due to re-cultivation of previously abandoned agricultural land.

**Most new artificial surfaces are built on cropland**, with the exception of a handful of countries where development mostly takes place on tree-covered areas, grasslands or shrubland.

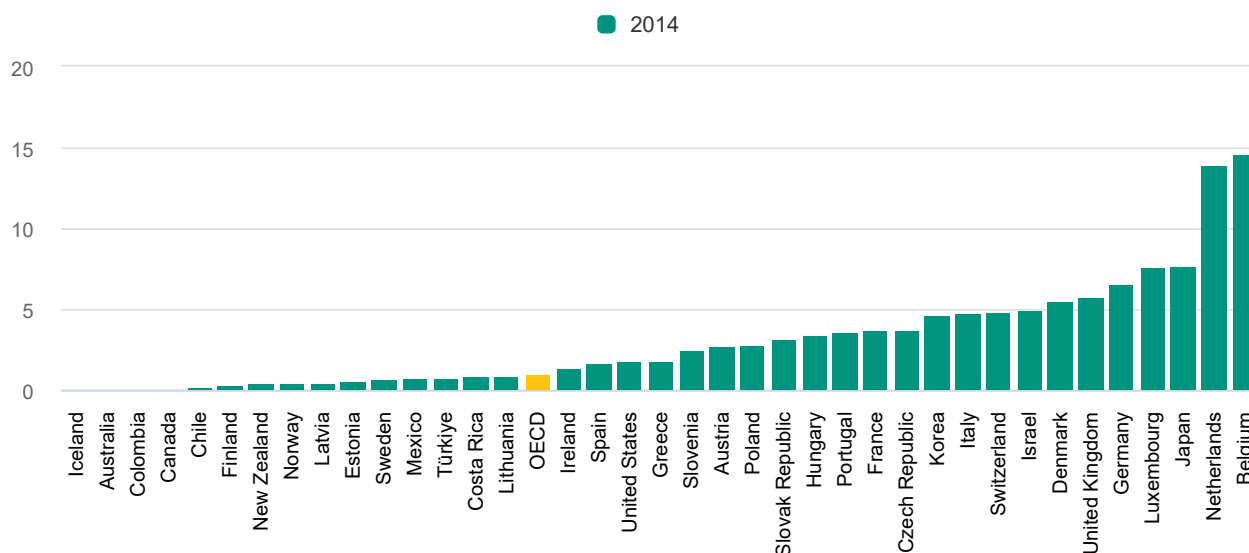
**Worldwide**, 3.1% of (semi-)natural vegetated land has been converted to other land cover types since 1992. This is an area around four times the size of Spain. OECD and G20 countries account for over half of these conversions, which occur primarily in Brazil, the People's Republic of China, the Russian Federation, the United States and Indonesia. Globally, an area greater than that of the United Kingdom (265 000 km<sup>2</sup>) has been converted to built-up areas since 1990.

**Gains of (semi-)natural land** are unlikely to compensate for losses, as for example, the costs of the loss of old-growth forest are not comparable to the benefits provided by equally sized new forest plantation.

## Indicators

### Share of built-up areas in total land area

Percentage of total land area

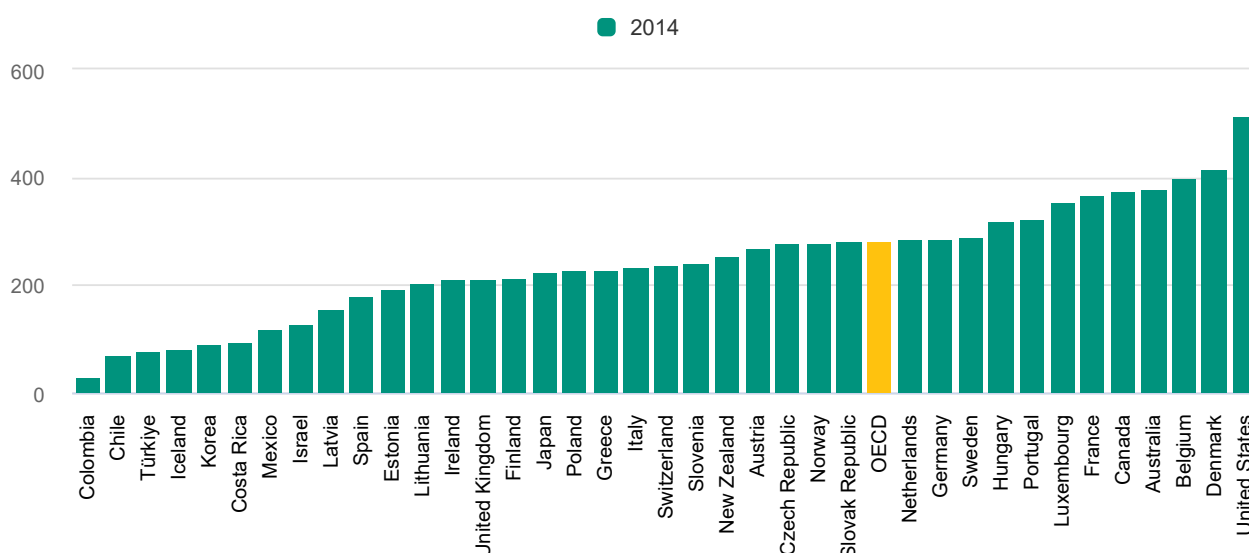


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Source: OECD, "Land resources: Built-up area and built-up area change in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/05bdbe10-en>.

### Built-up areas, intensities per capita

square metre per capita



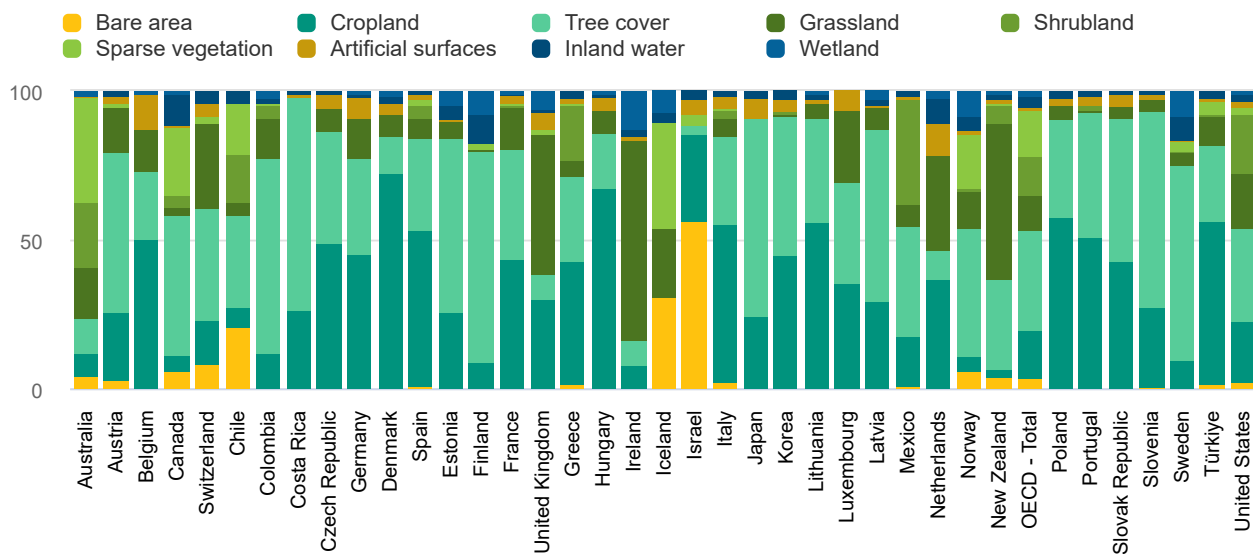
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Source: OECD, "Land resources: Built-up area and built-up area change in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/05bdbe10-en>.



### Land cover by type

Percentage, 2019

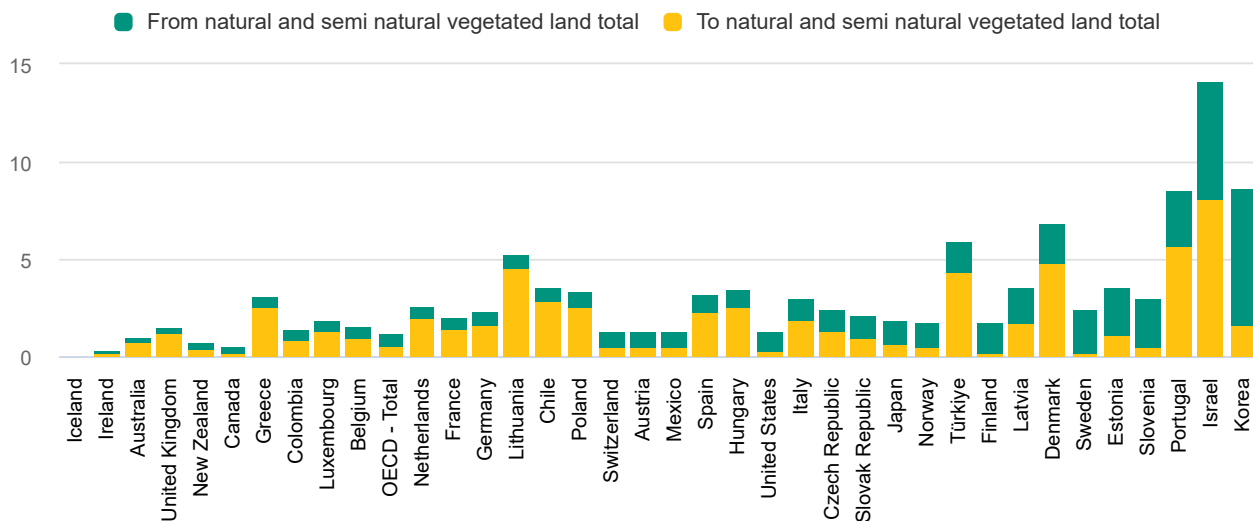


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Source: OECD, "Land resources: Land cover in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/c9c5f666-en>.

### Conversions to and from natural and semi-natural vegetated land, 2004-2019, OECD

Share of natural and semi-natural vegetated land in 2004, %



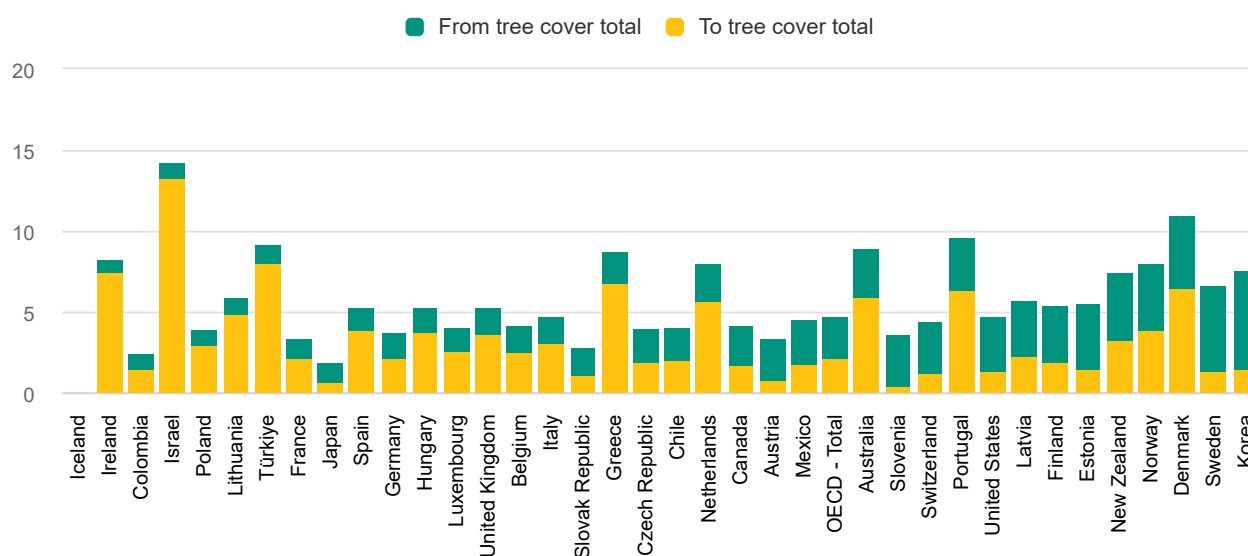
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Source: OECD, "Land resources: Land cover change in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/3bce4397-en>



### Conversions to and from tree cover, 2004-2019, OECD

Share of tree cover in 2004, %



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Source: OECD, "Land resources: Land cover change in countries and regions", *OECD Environment Statistics* (database), <https://doi.org/10.1787/3bce4397-en>.

### Comparability and interpretation

Changes in the biophysical characteristics of natural habitats – that can be measured with data on land cover – are a relatively good proxy to monitor pressures on ecosystems and biodiversity.

For further details see the metadata in the source databases listed under *Sources* below.

### Forest resources

#### Key messages

- Many **forests** are threatened by degradation, fragmentation and conversion to other land types. Demand for wood to reach renewable energy targets plays an important role in the commercial exploitation of forests.
- Forests are unevenly distributed. A handful of the most forest-rich countries account for the bulk of the world's forest resources. OECD countries account for about 27% of the world's **forest area**.
- At national level, most OECD countries show a **sustainable use** of their forest resources. In forests available for wood supply, most do not over-harvest their resources, maintaining the use intensity below 100%.

#### Main trends and recent developments

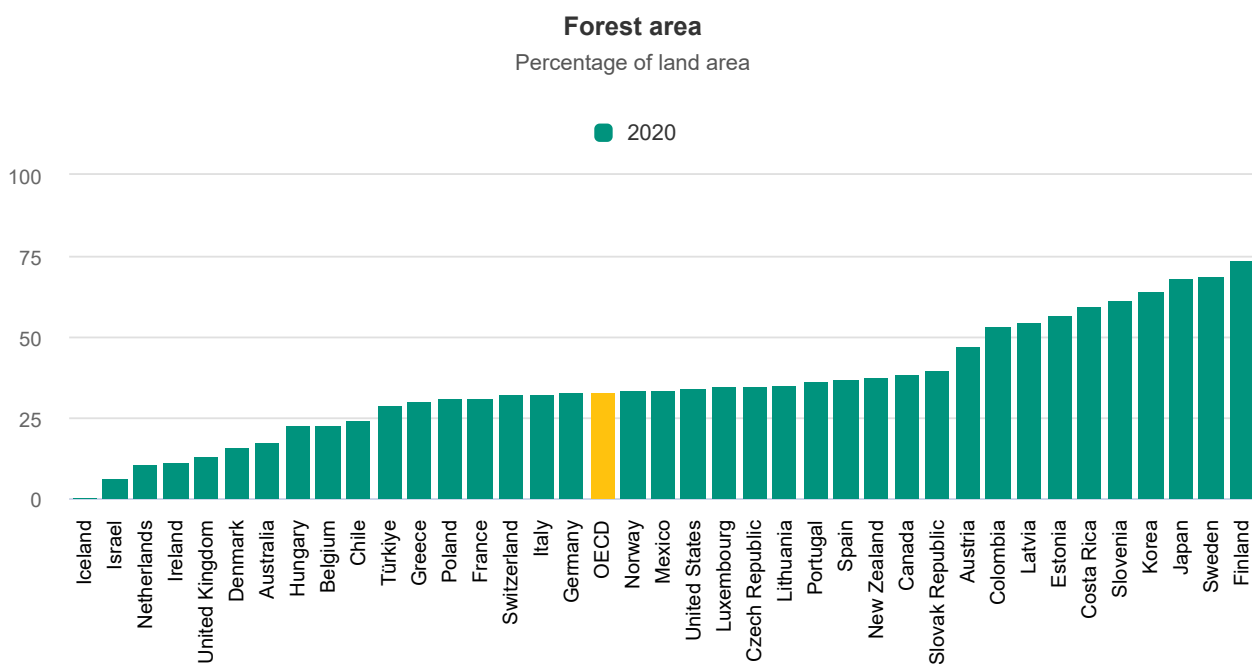
Many **forest resources** are threatened by overexploitation, fragmentation, degradation of environmental quality and conversion to other types of land use. The main pressures result from human activities, including agriculture expansion, transport infrastructure development, unsustainable forestry, air pollution, climate change and intentional burning of forests. Demand for wood to reach renewable energy targets plays an important role in the commercial exploitation of forests.

Forests are unevenly distributed. A handful of the most forest-rich countries account for the bulk of the world's forest resources. OECD countries account for about 27% of the world's **forest area**. Since 1990, the

area of forests and wooded land has remained stable or has slightly increased in most OECD countries, but it has been decreasing at world level due in part to continued deforestation in tropical countries, often to provide land for agriculture, grazing and logging.

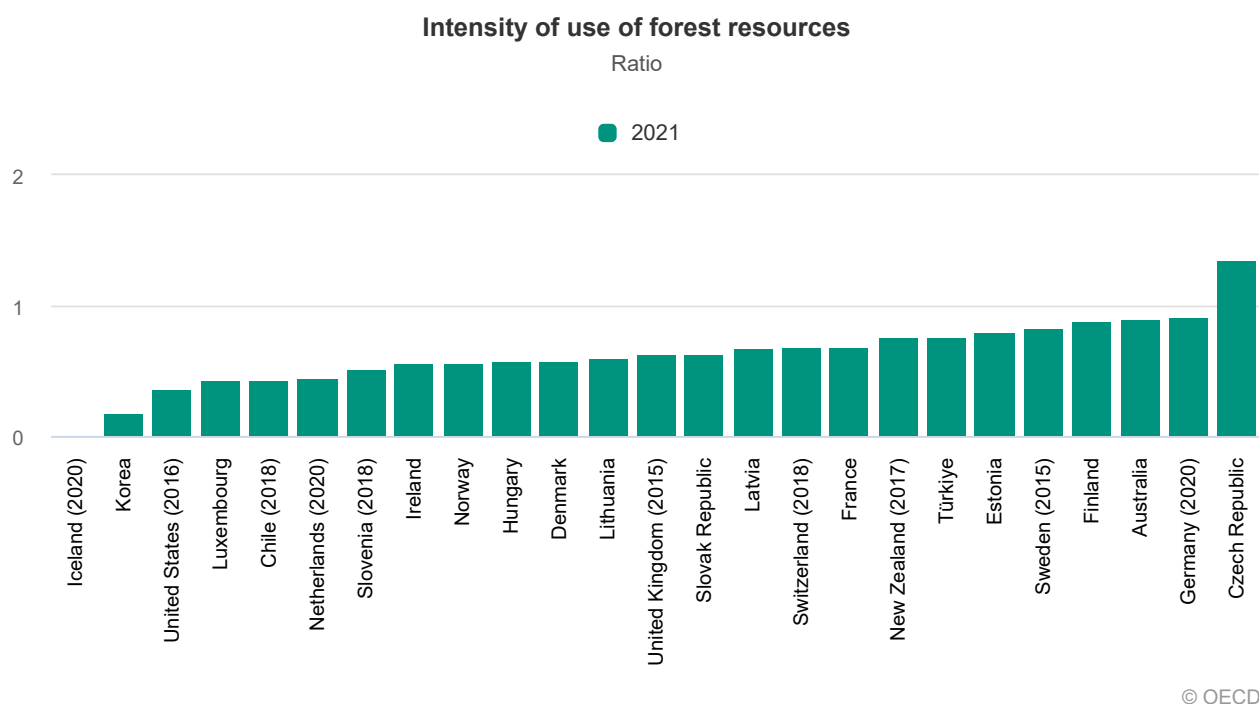
Most OECD countries show a **sustainable use** of their forest resources. In forests available for wood supply, most do not over-harvest their forest resources, maintaining the use intensity below 100%. However, there is significant variation among and within countries. Since the 1990s, intensity of forest use has generally increased in most of the countries for which longer trends are available. This is partly due to the use of wood as biomass for energy. Korea shows a relatively low intensity because its forests are young and grow rapidly (due to massive reforestation programmes since 1973).

### Indicators



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Source: OECD, "Land resources: Land use", *OECD Environment Statistics* (database), <https://doi.org/10.1787/8ecc9c9c-en>.



Source: OECD, "Forest resources", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00600-en>.

### Comparability and interpretation

The **intensity of use** of forest resources provides insights into quantitative aspects of forest resources. It presents national averages that may conceal important variations among forests. It should be read with information on forest quality (e.g. species diversity, including tree and non-tree species; forest degradation; forest fragmentation) and be complemented with data on forest management practices and protection measures. Data on the intensity of use of forest resources can be derived from forest accounts and from international forest statistics and the FAO/UNECE Forest Resource Assessments for most OECD countries, although differences in the variables monitored result in interpretation difficulties. Historical data often lack comparability or are not available over longer periods.

For further details see the metadata in the source databases listed under *Sources* below.

## Threatened species and protected areas

### Key messages

- **Pressures on biodiversity** are increasing. A high percentage of species are threatened, particularly in countries with high population density, and a high level of concentration of human activities.
- In the OECD area, **amphibians, birds and mammals** are on average more threatened than **plants, invertebrates and freshwater fish**.
- **Protected areas** are growing in all OECD countries and now cover on average 16% of land and 21% of marine areas (compared to respectively 10% and 3% in 2000). Worldwide, protected areas followed the same trend and cover 13% of land areas and 17% of marine areas (from 9% and 1% in 2000 respectively).



## Main trends and recent developments

Pressures on biodiversity are increasing. Many natural ecosystems have been degraded, limiting the services they provide, and many animal and plant species are threatened by habitat alteration or loss, both within and outside protected areas (e.g. on farms and in forests). In most OECD countries, the number of **animal and plant species** identified as endangered is increasing, particularly in countries with a high population density, and a high level of concentration of human activities. Amphibians, birds and mammals are on average more threatened than plants, invertebrates and freshwater fish. But specialist birds have declined by nearly 30% in 40 years, reflecting habitats degradation. The largest declines occurred in grasslands and arid lands in North America, and in farmed lands in Europe.

**Protected areas** are growing in all OECD countries. They cover on average 16% of the land area and 21% of marine areas (i.e. exclusive economic zones - EEZ), compared to respectively 10% and 3% in 2000. However, biodiversity outcomes and actual protection levels remain difficult to evaluate, as protected areas change over time: new areas are designated, boundaries are revised and some sites may be destroyed or changed by pressures from economic development or natural processes. Environmental performance depends both on the designation of the area and on management effectiveness.

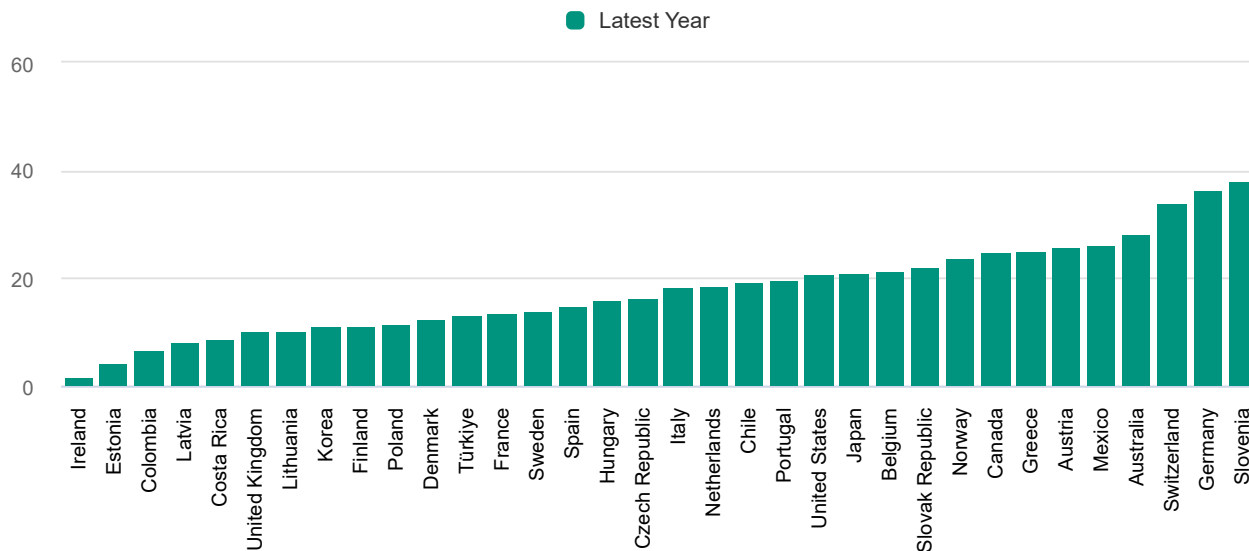
**Worldwide**, the designation of new terrestrial protected areas were designated at a consistently high rate since 1970 and now cover 13% of the land area. Designation of marine protected areas was slow until 2000. Since then, they increased by more than 22 million square kilometres and now cover about 17% of marine areas.

Based on the indicators shown, around 26 OECD countries would meet or almost meet the **Aichi 2020 target** to protect at least 17% of their land area and 20 countries the target to protect at least 10% of coastal and marine areas. However, there are large variations among countries in the extent and the management objectives of **terrestrial protected areas**. These can be partly explained by differences in geography, ecology, and the pre-existing patterns of human settlement in the territory. Some countries (e.g. Chile, Iceland, Luxembourg, New Zealand, Norway) have designated proportionally large areas as strict nature reserves, national parks and wilderness areas (IUCN management categories I-II). Some countries (e.g. Belgium, Israel, Luxembourg and New Zealand) use these designations to establish habitats and species management areas (categories III and IV) and others (e.g. France, Germany, Greece, Poland, the Slovak Republic and Slovenia) for the preservation of cultural heritage or the promotion of sustainable resource use (categories V and VI). Still other countries use mainly regional and international designations such as the European Natura 2000 regional network (e.g. Ireland).

## Indicators

### Threatened mammals

Percentage of known species

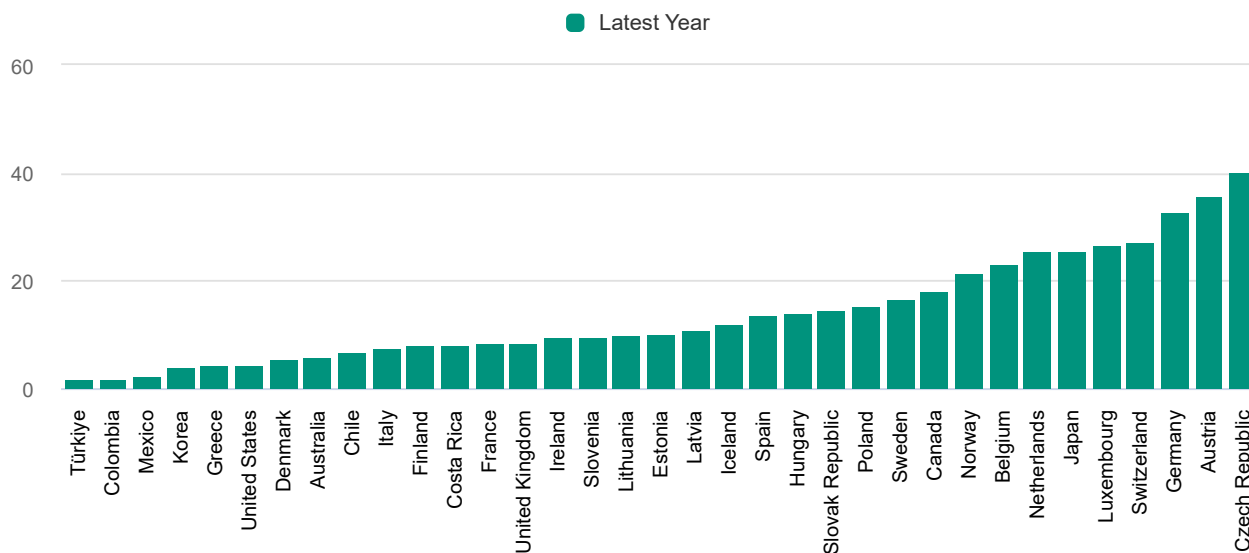


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Source: OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

### Threatened vascular plants

Percentage of known species

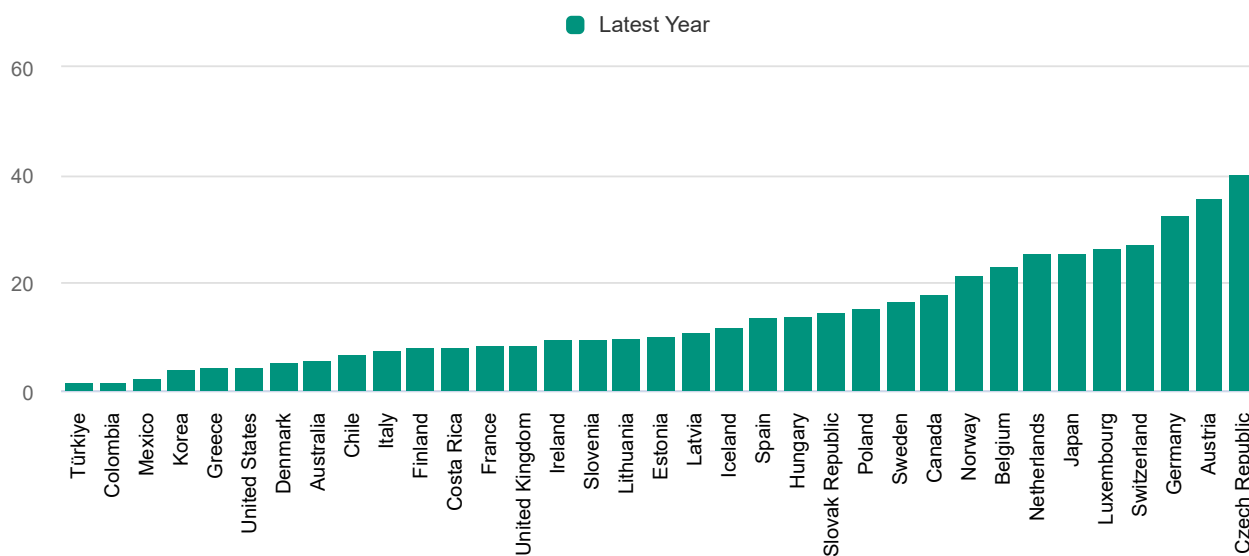


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Source: OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

### Threatened freshwater fish

Percentage of known species

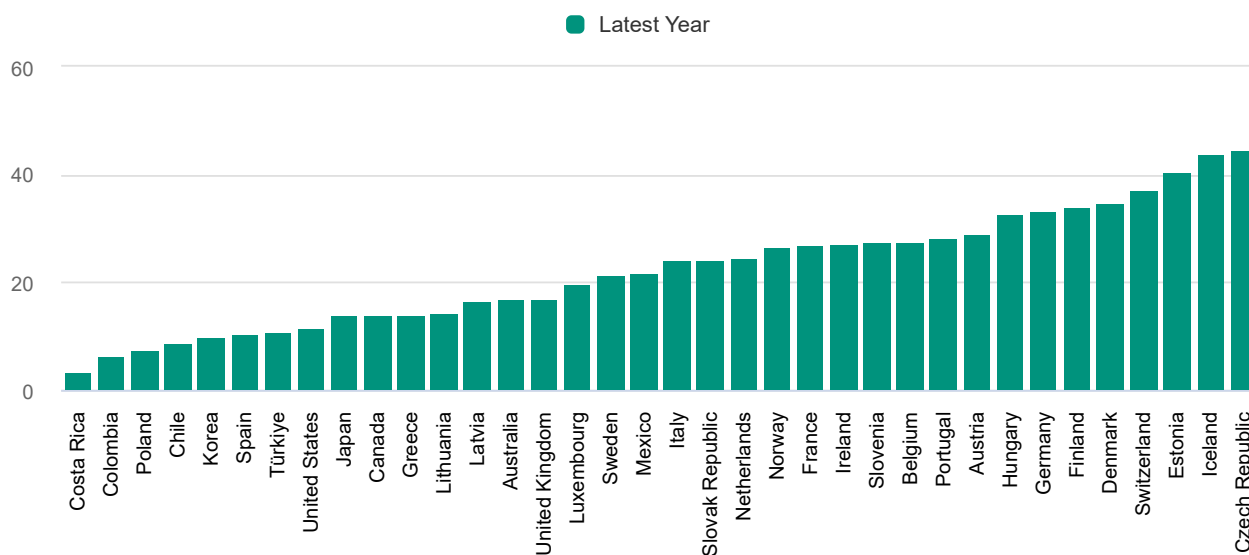


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Source: OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

### Threatened birds

Percentage of known species

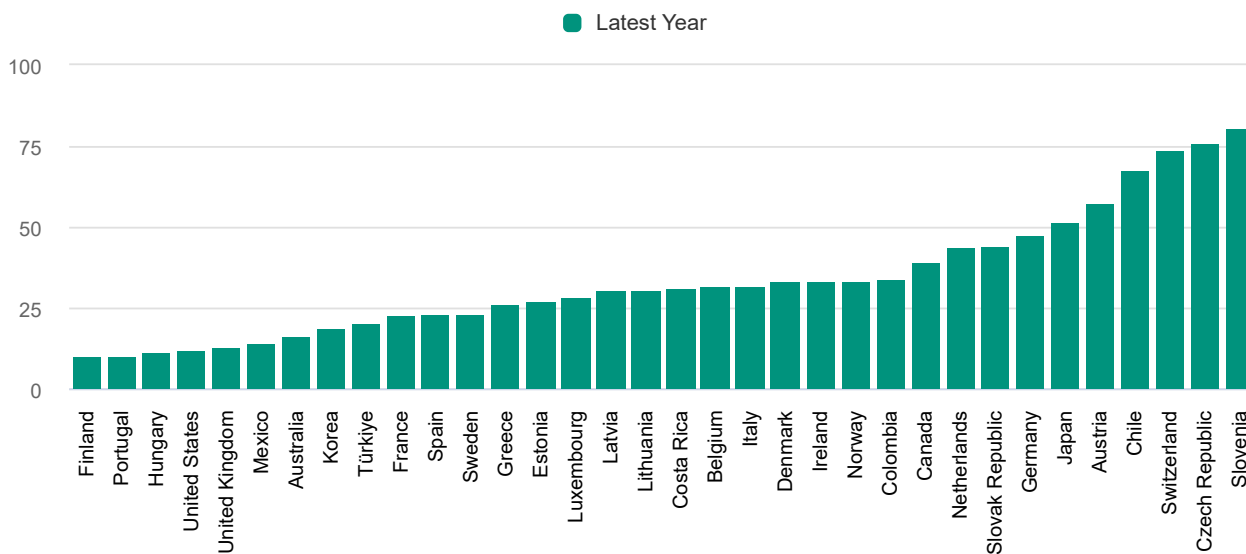


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Source: OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

### Threatened amphibians

Percentage of known species

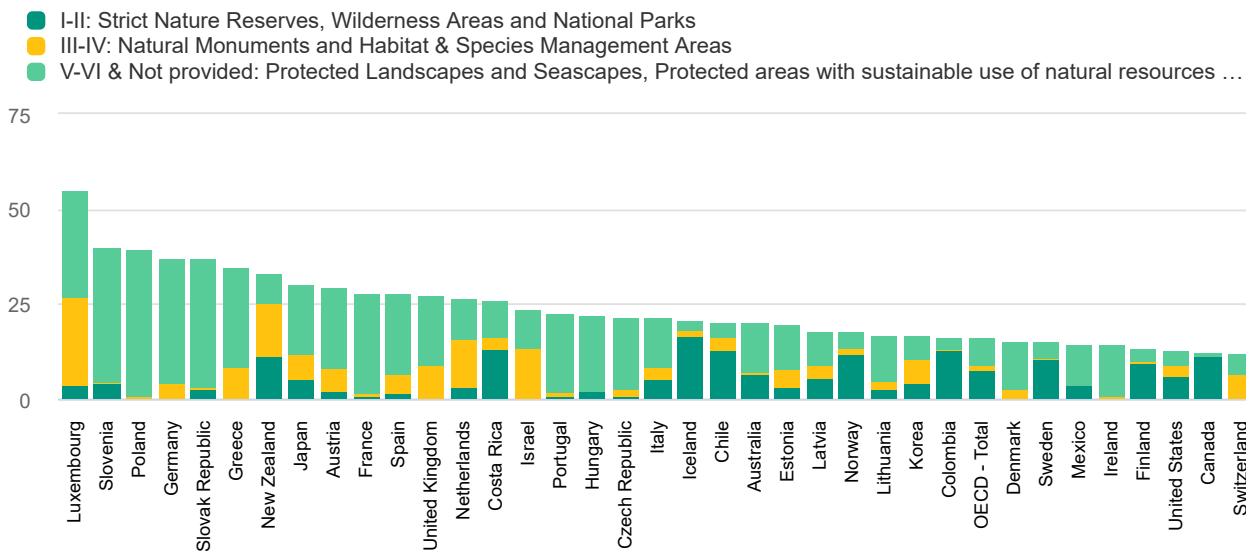


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Source: OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

### Terrestrial protected area by designation type

Percentage of total land, 2022

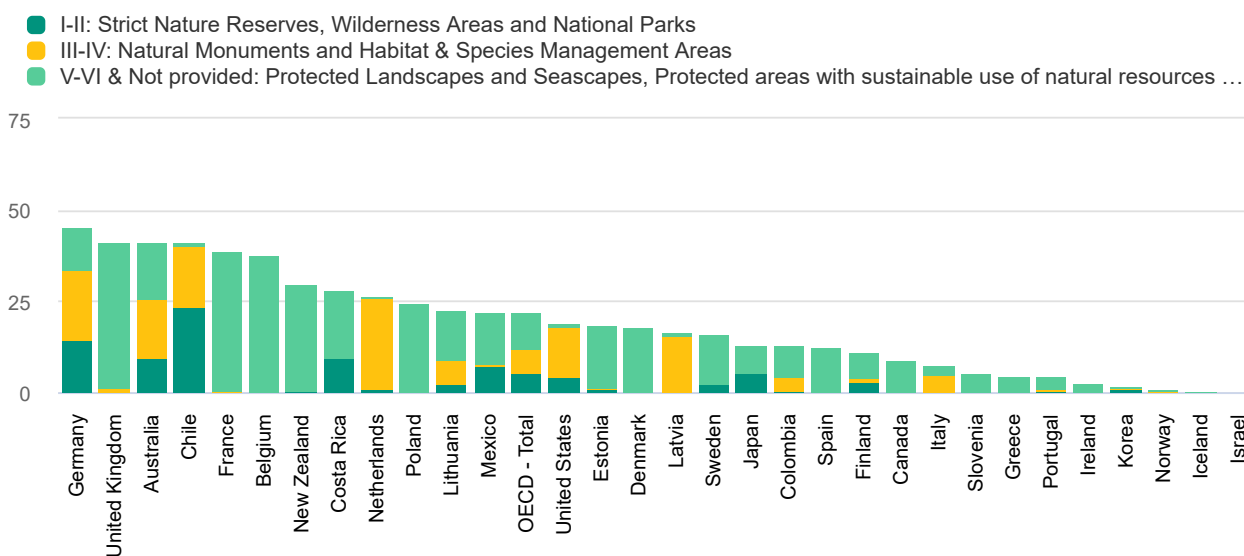


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Source: OECD, "Biodiversity: Protected areas", *OECD Environment Statistics* (database), <https://doi.org/10.1787/5fa661ce-en>.

### Marine protected area by designation type

Percentage of exclusive economic zone, 2022



© OECD

Source: OECD, "Biodiversity: Protected areas", *OECD Environment Statistics* (database), <https://doi.org/10.1787/5fa661ce-en>.

### Comparability and interpretation

Data on **threatened species** are available for all OECD countries with varying degrees of completeness. The number of species known or assessed does not always accurately reflect the number of species in existence, and the definitions that should follow IUCN standards are applied with varying degrees of rigour in countries. Historical data are generally not comparable or not available. For many of the incompletely evaluated species groups, assessment efforts have focused on species that are likely to be threatened; therefore any percentage of threatened species reported for these groups would be heavily biased (i.e., the % threatened species would likely be an overestimate). For some countries, data include extinct species. For some countries, birds' data refer to breeding species only.

Data on **protected areas** are available for all OECD countries. The definitions, although harmonised by the World Conservation Monitoring Centre, may vary among countries. The extent, and management types, of terrestrial and marine protected areas can indicate countries' efforts to safeguard habitats and species as well as landscapes shaped by human-environment interactions that are valued for cultural or other reasons. Protected areas are not always representative of national biodiversity or sufficiently connected. Indicators on the extent of protected areas do not reflect the effectiveness of the management of these areas.

For further details see the metadata in the source databases listed under *Sources* below.

### Taxes relevant for biodiversity

#### Key messages

- In the OECD area, **biodiversity-related taxes** raised USD 10.9 billion in 2020, representing only about 1% of environmentally related tax revenue.
- Revenue from biodiversity-related taxes is raised primarily from taxing **pollution** and **resources**, while transport and energy tax bases play a minor role in generating revenue.



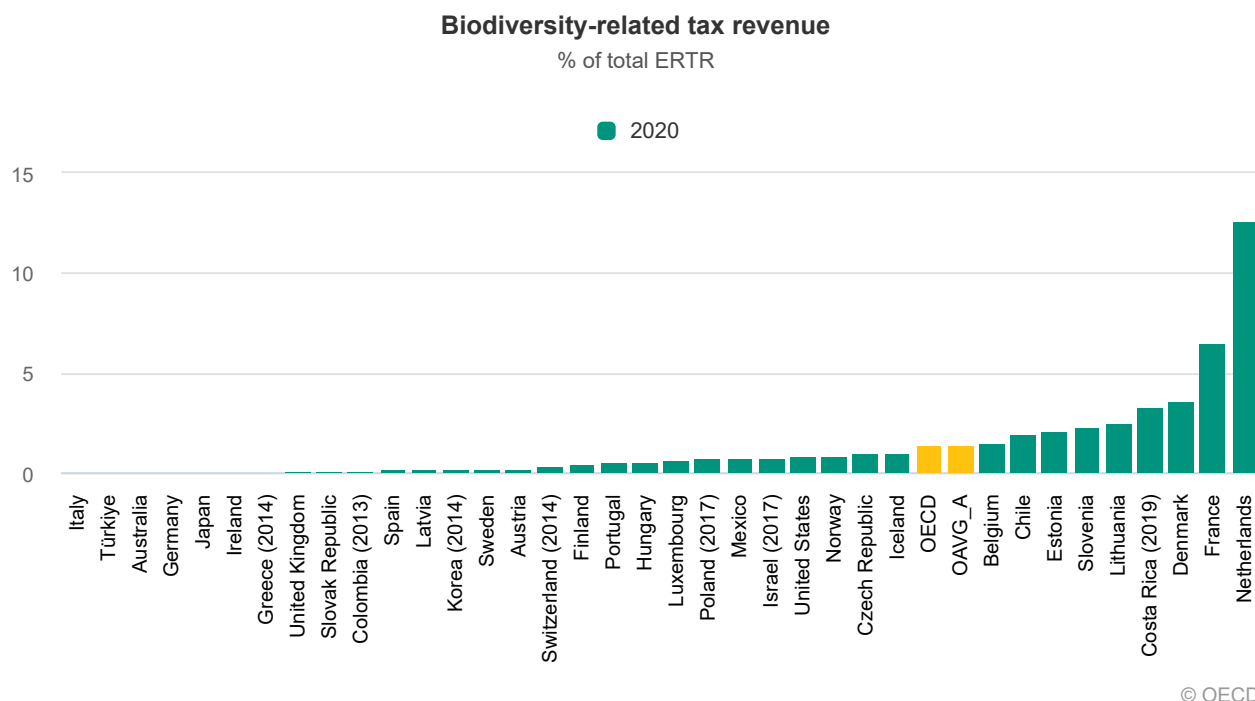
- Overall, the share of **environmentally related tax revenue** (ERTR) continues to decline in OECD countries, amounting to 5% of total tax revenue in 2020, down from 5.9% in early 2000s. Compared to GDP, ETRT is also decreasing and reached 1.5% of GDP in 2020, down from 1.8% in early 2000s.

### Main trends and recent developments

In the OECD area, biodiversity-related taxes raised USD 10.9 billion in 2020, representing a small but increasing share of all environmentally related tax revenue (1.3% in 2020). This share has decreased marginally from 1.2% in 2000. The bulk of revenue coming from taxes relevant to biodiversity is raised from taxing pollution (46%) and resources (35%), while energy and transport tax bases play a minor role in generating revenue.

Overall, the share of environmentally related tax revenue (ERTR) continues to decline in OECD countries, amounting to 5% of total tax revenue in 2020, down from 6.1% in early 2000s. Compared to GDP, ETRT is also decreasing and reached 1.5% of GDP in 2020. The decreasing trend is a combination of factors, namely, that tax rates are typically defined in physical units (e.g. per litre) and hence are set in nominal terms. Without inflation adjustment, these rates decrease in real terms over time. While countries such as Denmark, the Netherlands and Sweden have implemented such adjustments, most OECD countries do not yet apply inflation adjustments to environmentally related taxes. Another factor contributing to this trend is the increase in crude oil prices up until mid-2014, which triggered substitution away from motor fuel use, also making adjustments in nominal tax rates on motor fuels politically difficult. Yet some countries, such as Slovenia, Costa Rica, Turkey and Estonia strengthened the role of environmentally related taxes and have tripled their share of tax revenue since 2000.

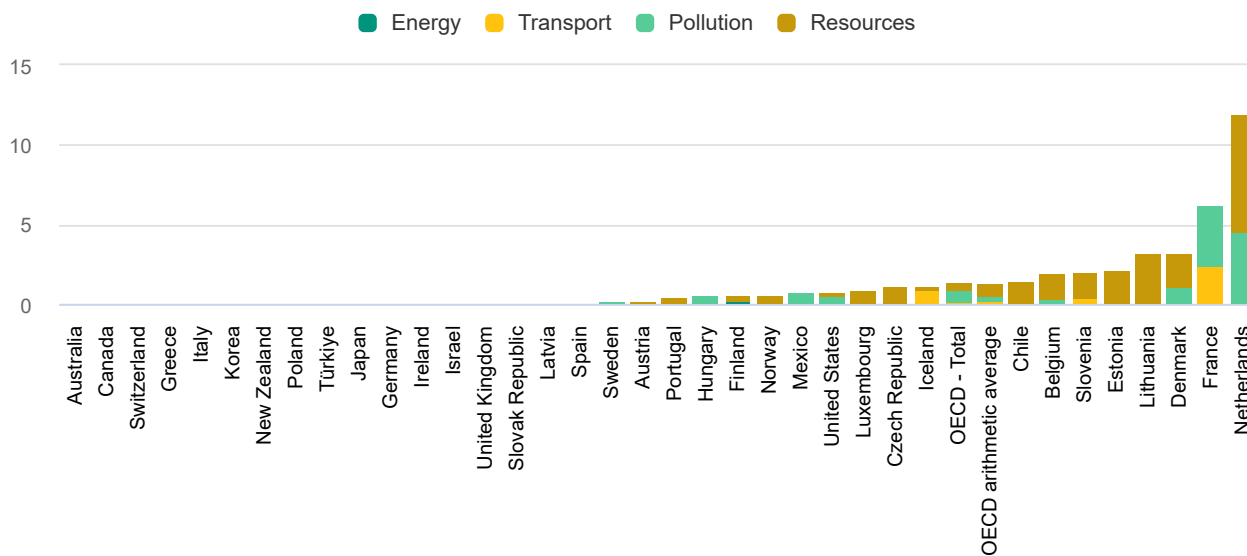
### Indicators



Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), <https://doi.org/10.1787/df563d69-en>.

### Biodiversity-related tax revenue by tax base

% total ETRR

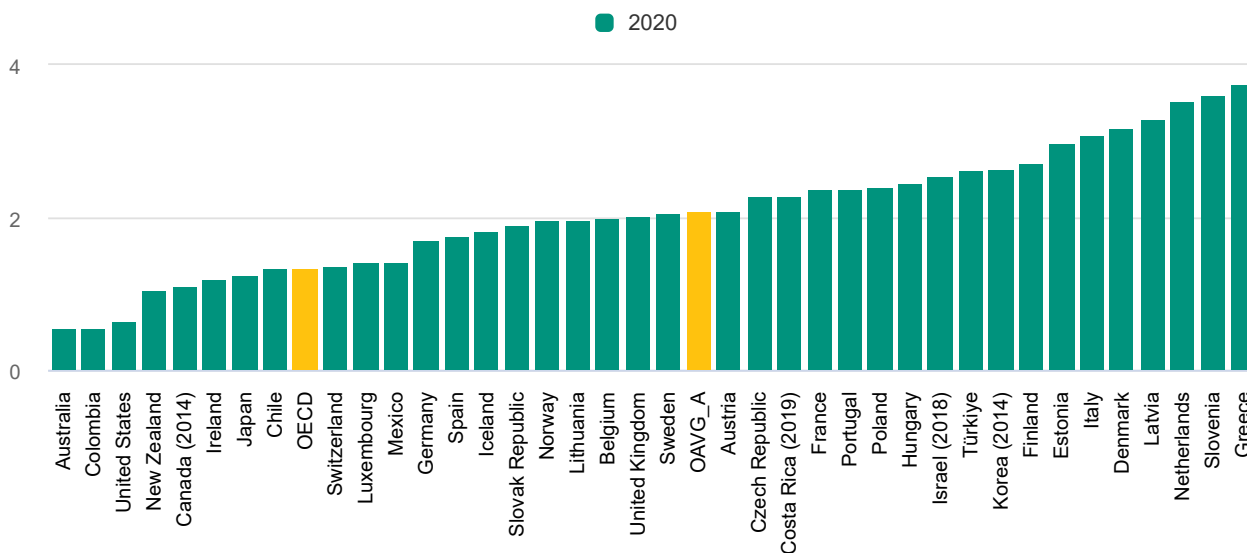


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Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), <https://doi.org/10.1787/df563d69-en>.

### Environmentally related tax revenue

% GDP

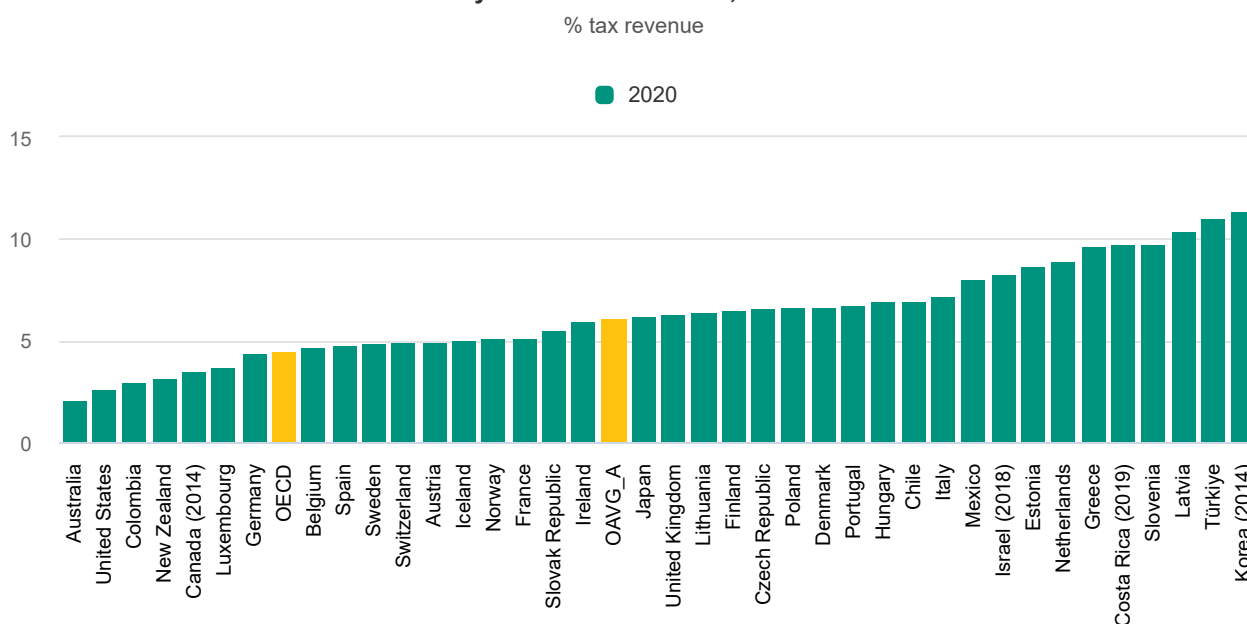


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Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), <https://doi.org/10.1787/df563d69-en>.



Environmentally related tax revenue, % total tax revenue



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Source: OECD, "Environmental policy: Environmentally related tax revenue", *OECD Environment Statistics* (database), <https://doi.org/10.1787/df563d69-en>.

### Comparability and interpretation

The indicators on environmentally related taxes should not be used to assess the “environmental friendliness” of the tax systems. For such analysis, additional information, describing the economic and taxation structure of each country, is required. Moreover, a number of environmentally related taxes can have important environmental impacts even if they raise little (or no) revenue. In addition, revenue from fees and charges, and from royalties related to resource management, is not included.

Comparisons of ETRs in OECD countries provide a useful starting point for analysing the impact of environmental taxation, however, comparing only the levels of revenue does not provide the full picture of a country’s environmental policy, as it does not provide information on the levels of tax rates or the exemptions applied. Other parts of the OECD PINE database, including information on tax rates and exemptions, allows deeper assessment of the environmental impacts of these taxes. In addition, governments may choose to implement environmental policy using a range of other instruments, including fees and charges, expenditures (both direct and subsidies) and regulation, some of which are also detailed in the PINE database (see <http://oe.cd/pine> for information on the use of alternative instruments in countries).

For further details see the metadata in the source databases listed under *Data sources* below.

### Glossary

**Biodiversity-related tax revenue:** Revenue raised from taxes and auctioning of tradable permits directed at biodiversity. These include specific taxes on i) energy products for water transport purposes; ii) vehicles and vessels for water transport (e.g. one-off or recurrent taxes on ownerships and use of boats); iii) discharges into water bodies, soil contamination, etc. and iv) resource extraction such as fishing or hunting taxes, forestry taxes, water abstraction, revenue from auctioning of individual transferable quotas for fisheries.

The information on taxes and the associated tax revenue is extracted from the OECD Policy Instruments for the Environment (PINE) database (<http://oe.cd/pine>). The PINE database, contains quantitative and qualitative information on over 3500 policy instruments in 110 countries worldwide. Policy instruments are tagged into 13 environmental domains that represent the focal issues (environmental externalities). Instruments can have both a direct and an indirect effect on several environmental domains; however, only the domain to which the instrument has a direct effect is considered. For more details, see the metadata to the OECD Environmentally related tax revenue dataset.

**Built-up areas:** Expressed in m<sup>2</sup> per capita and as a percentage of total land area. "Built-up" is defined as the presence of buildings (roofed structures). This definition largely excludes other parts of urban environments and the human footprint such as paved surfaces (roads, parking lots), commercial and industrial sites (ports, landfills, quarries, runways) and urban green spaces (parks, gardens). Consequently, such built-up area may be quite different from other urban area data that use alternative definitions.

**Forest area as percentage of land area:** Forest land refers to land area spanning more than 0.5 ha and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It excludes woodland or forest predominantly under agricultural or urban land use and that used only for recreation.

**Intensity of use of forest resources (timber):** Actual harvest or fellings over annual productive capacity. Annual productive capacity is either a calculated value, such as annual allowable cut, or an estimate of annual growth for existing stock. It should be noted that the national averages presented here may conceal variations among forests.

**Land cover type:** The observed physical and biological cover of the Earth's surface, including natural vegetation, abiotic (non-living) surfaces and inland.

**Natural and semi-natural land:** Used to designate land covered by natural or semi-natural vegetation with limited anthropogenic footprint as a proxy for land which is important for maintaining biodiversity and provides higher-value ecosystem services at the global scale.

**Terrestrial and marine protected areas as percentage of total land and of exclusive economic zone (EEZ):** Protected areas are areas of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means. The data refer to the World Conservation Union (IUCN) management categories I-VI. National classifications may differ. The data cover areas under the management categories:

- I (strict nature reserves and wilderness areas),
- II (national parks),
- III (natural monument or feature)
- IV (habitat or species management area),
- V (protected landscape or seascape) and
- VI (protected area with sustainable use of natural resources).

Areas nationally/internationally designated without any IUCN category assigned are also included. This category includes regional and international designations such as the European Natura 2000 network.

In general, under the 1982 UN Convention on the Law of the Sea the EEZ of a country extends 200 nautical miles from the coastline, or to the mid-point between coastlines where the EEZ of different countries would otherwise overlap.

**Threatened species:** The number of threatened species compared to the number of known or assessed species. "Threatened" refers to the categories of "endangered", "critically endangered" and "vulnerable" species (i.e. species in danger of extinction and species soon likely to be in danger of extinction), as defined by the IUCN.

**Vegetation loss:** Percentage of tree cover, grassland, wetland, shrubland and sparse vegetation converted to any other land cover type. The denominator used is the 'stock' of natural and semi-natural land at the start of the period.

### Data sources

OECD, "Biodiversity: Threatened species", *OECD Environment Statistics* (database), <https://doi.org/10.1787/data-00605-en>.

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OECD (2020), Policy Instruments for the Environment (PINE) database, <http://oe.cd/pine>

### References and further reading

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BirdLife International, <https://www.birdlife.org/>

Biodiversity Indicators Partnership (BIP) <https://www.bipindicators.net/>

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